REMARKS

Amendments

Claim 1 has been amended to be more specific with respect to the temperature of the pre-reaction zone. Support for this amendment is found throughout the specification, including paragraphs [0037] and [0051]. Claims 5 and 6 are withdrawn from consideration.

Upon entry of the foregoing amendments, claims 1-4 and 7-28 are pending. Reconsideration of the present application, as amended, and allowance of the pending claims is respectfully requested in view of the following remarks.

Rejection Under 35 U.S.C. § 103

The Examiner rejected claims 1 and 5-10 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 6,221,280 to Anumakonda et al. (hereinafter "Anumakonda") in view of Dicks, *Journal of Power Sources*, vol. 61, pg 113-124 (hereinafter "Dicks"). The Examiner rejected claims 2-4 as being unpatentable over Anumakonda in view of Dicks and U.S. Patent 5,567,228 to Abdulally (hereinafter "Abdulally"). The Examiner rejected claims 11-16 as being unpatentable over Anumakonda in view of U.S. Patent 4,331,451 to Isogaya et al. (hereinafter "Isogaya") and U.S. Patent 6,103,143 to Sircar et al. (hereinafter "Sircar"). The Examiner rejected claims 17-28 as being unpatentable over Anumakonda in view of Dicks, Isogaya, and Sircar. Applicants respectfully traverse these rejections.

One of Ordinary Skill Would Not Be Motivated to Combine Anumakonda with Dicks

The combination of Anumakonda and Dicks would not be obvious to one of ordinary skill in the art. Anumakonda teaches "a method of processing sulfur-containing heavy hydrocarbon fuels in the substantial absence of steam" (Abstract) and in the substantial absence of desulfurization (Col. 8, Lines 30-40). Dicks teaches that in the generation of hydrogen from

natural gas (i.e., methane), "it is essential that sulfur compounds in the natural gas are removed *upstream* of the reformer" using various types of desulfurisation processes" (Abstract). One of ordinary skill would not be motivated to combine a reference for the conversion of sulfur-containing heavy hydrocarbon fuels (Anumakonda) with a reference for the conversion of desulfurised light hydrocarbon fuels (Dicks).

Anumakonda In Combination with Dicks

Even if one of ordinary skill were somehow motivated to combine Anumakonda and Dicks, the combination of Anumakonda and Dicks fails to teach or suggest the desirability of a *pre-reaction zone upstream of the catalytic reaction zone.* More particularly, neither Anumakonda nor Dicks, alone or in combination, teaches or suggests that *cooling the pre-reaction zone to maintain the temperature of the feed gas mixture below the flash point* prevents carbon deposition reactions from occurring.

Applicants respectfully disagree with the Examiner's position that the *pre-reforming* of hydrocarbon fuels taught by Dicks renders obvious the *pre-reaction zone* required by Applicants' claimed invention. Dicks teaches that it is desirable to pre-reform the heavier hydrocarbons present in the feed stream *prior* to feeding the gas to the main reactor, thereby preventing carbon deposition (Pg. 117, N[8] and accompanying text). More particularly, Dicks teaches that pre-reforming removes the heavy hydrocarbons from the gas feed *before* the gas is fed to the main reformer. Applicants' claimed invention, however, specifically teaches that the temperature of the pre-reaction zone is maintained at a temperature from about 150°C to about 250°C, temperatures *below* that of typical pre-reforming processes. Dicks makes no teaching or suggestion that it is desirable to maintain reduced temperatures from about 150°C to about 250°C in a pre-reaction zone *to avoid* conversion of the heavy hydrocarbons, thereby avoiding

carbon deposition. Thus, contrary to Dicks, Applicants' claimed invention teaches that the temperature should be maintained at a temperature that *prevents* premature removal of heavy hydrocarbons from the gas feed *before* the gas is fed to the main reactor.

Moreover, Applicants' own lexicography excludes the possibility that pre-reaction zone comprising a pre-reforming zone. The meaning of "pre-" generally is understood as meaning before or prior to. Thus, "pre-reaction" means before the reaction, which would exclude pre-reforming, which includes the conversion of heavy hydrocarbons to lighter hydrocarbons, as taught by Dicks.

Anumakonda In Combination with Dicks and Abdulally

Applicants' respectfully disagree with the Examiner's reliance on Abdulally to teach methods of cooling the heavy hydrocarbon feed in the pre-reaction zone. Abdulally teaches a method of cooling relatively high temperature *syngas* for the removal of pollutants (Col. 2, Lines 20-24). Abdulally does not, however, make any teaching or suggestion of the desirability of cooling a heavy hydrocarbon feed gas in a pre-reaction zone *before* conversion to syngas.

Anumakonda In Combination with Isogaya and Sircar

Anumakonda, Isogaya, and Sircar, alone or in combination, fail to teach or suggest a *post-reaction zone maintained at a temperature greater than about 600°C*, as required by Applicants' independent claims 11 and 17. More particularly, none of the references teach or suggest the desirability of maintaining the temperature of the exit gas *after* leaving the reaction zone. Isogaya and Sircar only teach the desirability of maintaining the temperature of the gas *in* the reaction zone.

Anumakonda In Combination with Dicks, Isogaya, and Sircar

Applicants' respectfully refer the Examiner to the arguments made hereinabove distinguishing the Applicants' claimed invention from the prior art.

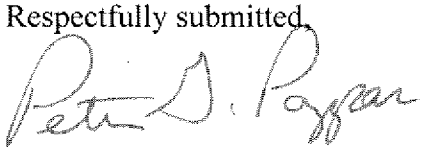
The rejections are unsupported by the prior art and must be withdrawn, as a case of *prima facie* obviousness clearly is lacking.

Conclusions

For the foregoing reasons, Applicants submit that claims 1-4 and 7-28 are novel and nonobvious in view of the prior art. Allowance of the pending claims is therefore earnestly solicited.

If there are any issues which can be resolved by a telephone conference or an examiner's amendment, the Examiner is invited to telephone the attorney at (404) 853-8064.

Respectfully submitted,



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